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Claims

[c1] A check valve comprising an outer body having an inner bore, and a shuttle arranged within said inner bore to move relative to said inner bore between a closed checking position locking flow of liquid through said check valve, and an open position allowing for a flow of liquid through said check valve, and a resilient means biasing a position of said shuttle toward said closed checking position, wherein said shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit in said inner bore and such that, when in said closed checking position, said middle portion engages with a sealing engagement, said inner bore.

[c2] A check valve comprising an outer bore having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position locking fluid of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an upstream

portion and a middle portion, each portion engaging or engageable with a sliding fit the bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, a sealing engagement of the inner bore.

[c3] The check valve as in claim 1 wherein said shuttle when in an open position allows said flow of liquid to be directed through a passage which first is through a passageway the shuttle, then through the outer body, and then through the shuttle to an outlet end of the body.

[c4] A check valve comprising an outer body having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position blocking flow of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit of the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, the sealing engagement of the inner bore and, when in an open position, arranged that the liquid will flow around the middle portion.

[c5] A check valve comprising an outer body having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position blocking flow of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle toward the said closed position, characterized in that the shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit, the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, a sealing engagement the inner bore and when in an open position it is arranged that the liquid will flow through a passage around a middle portion which passage includes at least a path through the outer body.

[c6] A check valve comprising an outer body having a cylindrical inner bore, and a shuttle arranged within the inner bore to move relative to the inner bore, and adapted to move between a closed checking position blocking flow of liquid through the valve, and an open position allowing for the flow of liquid through the valve, and a helical spring comprising resilient means, biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an up-

stream portion and a middle portion, each portion engaging or engageable with the sliding fit the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal a sealing engagement the inner bore and when in an open position, it is arranged that the liquid will flow through a passage around the middle portion which passage includes at least a path through the outer body and where the passageway includes a streamline alignment through the shuttle to the path through the outer body.

[c7] The check valve as in claim 6 wherein said flexible seal is held with the shuttle.

[c8] The check valve as in claim 6 wherein said flexible seal is held with the outer body.

[c9] The check valve as in claim 6 wherein said flexible seal is an O-ring.

[c10] The check valve as in claim 6 wherein said flexible seal is a bucket seal.

[c11] The check valve as in claim 10 wherein said flexible seal effects a sliding and therefore wiping action between the respective surfaces as it is urged into a closed position with respect to the valve of the body.

[c12] The check valve as in claim 11 wherein said flexible seal effects a sliding and therefore wiping action between the respective surfaces as it is urged into a closed position with respect to the valve of the body.

[c13] The check valve as in claim 7 wherein said shuttle is supported by engaging surfaces which are at an outer-most diameter of the shuttle in the case that the shuttle and the bore are of circular cross section or define a circular periphery.